

WHAT IS CLAIMED IS:

1. An optical disc system comprising:

an optical pickup that radiates a laser beam onto the optical disc to detect light reflected from the optical disc, wherein the optical pickup comprises a

5 tracking actuator, a focus actuator, and an objective lens;

a radio frequency amplifier that converts the reflected light into an electric signal to output a track-related signal;

a sled motor that moves the optical pickup toward an inner or outer perimeter of the optical disc in response to a sled servo drive signal;

10 a servo driver that outputs the sled servo drive signal and a tracking servo drive signal in response to one of a first servo control signal, and a second servo control signal; and

a servo signal processor that comprises an optical pickup movement determiner and outputs one of the first servo control signal and the second servo control signal, the optical pickup movement determiner determining from the track-related signal whether tracks are detected on the optical disc at a current position of the optical pickup and outputting a track determination signal indicating whether the optical pickup has moved to the innermost perimeter of the optical disc, based on the determination result,

20 wherein the tracking actuator moves the objective lens toward the inner or outer perimeter of the optical disc in response to the tracking servo drive signal.

2. The optical disc system of claim 1, further comprising a micro controller unit that outputs a limit check command and determines in response to the track determination signal whether the optical pickup has moved to the innermost perimeter of the optical disc,

5 wherein the servo signal processor outputs the first servo control signal in response to the limit check command,

the servo driver outputs the sled servo drive signal with a first voltage level and the tracking servo drive signal with a second voltage level in response to the first servo control signal,

10 the sled motor moves the optical pickup toward the inner perimeter of the optical disc in response to the sled servo drive signal with the first voltage level, and

the tracking actuator moves the objective lens toward the inner perimeter of the optical disc in response to the tracking servo drive signal with the second

15 voltage level.

3. The optical disc system of claim 1, wherein when the optical pickup movement determiner determines that tracks are not detected on the optical disc at the current position of the optical pickup, the optical pickup movement

20 determiner enables and outputs the track determination signal.

4. The optical disc system of claim 3, wherein:

the servo signal processor outputs the second servo control signal when the track determination signal is enabled;

the servo driver outputs the sled servo drive signal with a third voltage level and the tracking servo drive signal with a fourth voltage level in response to the second servo control signal;

the sled motor stops movement of the optical pickup in response to the sled servo drive signal with the third voltage level; and

the tracking actuator stops movement of the objective lens in response to the tracking servo drive signal with the fourth voltage level.

5. The optical disc system of claim 3, wherein:

the servo signal processor further outputs a third servo control signal when the track determination signal is enabled;

the servo driver outputs the sled servo drive signal with a fifth voltage level for a first period of time in response to the third servo control signal; and

the sled motor moves the optical pickup toward the outer perimeter of the optical disc for the first period of time in response to the sled servo drive signal with the fifth voltage level.

6. The optical disc system of claim 2, wherein the track-related signal is one of a track zero-cross signal, a mirror signal, and a track change signal.

7. The optical disc system of claim 6, wherein the radio frequency amplifier comprises a track change signal generator that generates the track change signal in response to the track zero-cross signal and the mirror signal.

8. The optical disc system of claim 6, wherein the optical pickup movement determiner comprises:

10 a first counter that starts a counting operation in response to a counting control signal, counts a number of times the track-related signal is output, in response to a clock signal, accumulates count values, and outputs the result as a first count value;

15 a track determiner that determines from the first count value whether tracks are detected on the optical disc at the current position of the optical pickup and outputs the track determination signal, based on the determination result, in response to a first enable signal; and

a timer that receives the clock signal and outputs a reset signal and the first enable signal every second period of time.

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9. The optical disc system of claim 8, wherein the timer outputs the reset signal after outputting the first enable signal.

10. The optical disc system of claim 8, wherein the optical pickup
5 movement determiner further comprises a multiplexer that outputs one of the track zero-cross signal, the mirror signal, and the track change signal as the track-related signal in response to a selection signal.

11. The optical disc system of claim 8, wherein the optical pickup
10 movement determiner further comprises:
a second counter that counts the number of times the track-related signal is output, accumulates the count value, and outputs a second count value in response to a second enable signal; and
a first control signal generator that compares the second count value with
15 a second set value and, if the second count value is equal to the second set value, outputs the counting control signal.

12. The optical disc system of claim 11, wherein the servo signal
processor further comprises a second control signal generator that generates the
20 second enable signal in response to the limit check command.

13. The optical disc system of claim 8, wherein the first counter counts up the number of times the track-related signal is output every period of the clock signal when the track-related signal is high, and counts down the number of times the track-related signal is output every period of the clock signal when the track-related signal is low.

14. The optical disc system of claim 13, wherein:
the first count value comprises a plurality of bits comprising at least one sign bit; and
the first counter outputs the first count value comprising a positive sign bit when the number of times counting up is performed is greater than the number of times counting down is performed, and the first counter outputs the first count value comprising a negative sign bit when the number of times counting up is performed is less than the number of times counting down is performed.

15. The optical disc system of claim 14, wherein:
the track determiner enables the track determination signal when the first count value is less than a first set value; and
the first set value comprises a plurality of bits comprising a negative sign bit.

16. The optical disc system of claim 14, wherein the track determiner enables the track determination signal when the first counter outputs the first count value comprising the negative sign bit for a third period of time.

5 17. The optical disc system of claim 8, wherein the first counter is reset in response to the reset signal to restart the counting operation, holds the first count value when the track determination signal is enabled, and does not respond to the reset signal received after receiving the track determination signal.

10 18. The optical disc system of claim 8, wherein the first counter counts up the number of times the track-related signal is output every period of the clock signal when the track-related signal is low, and counts down the number of times the track-related signal is output every period of the clock signal when the
15 track-related signal is high.

19. The optical disc system of claim 18, wherein:
the first count value comprises a plurality of bits comprising at least one sign bit; and

20 the first counter outputs the first count value comprising a negative sign bit when the number of times counting up is performed is greater than the number of

times counting down is performed and, and the first counter outputs the first count value comprising a positive sign bit when the number of times counting up is performed is less than the number of times counting down is performed.

5 20. The optical disc system of claim 19, wherein:

 the track determiner enables the track determination signal when the first count value is greater than a first set value; and

 the first set value comprises a plurality of bits comprising a positive sign bit.

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 21. The optical disc system of claim 19, wherein the track determiner enables the track determination signal when the first counter outputs the first count value comprising the positive sign bit for a third period of time.

15 22. The optical disc system of claim 2, wherein the optical disc is a blank disc on which data is not recorded, and the track-related signal is a wobble signal that is a virtual track signal for recording.

 23. The optical disc system of claim 2, further comprising a spindle
20 motor that rotates the optical disc at a constant linear velocity or a constant

angular velocity in response to a first spindle servo drive signal and stops rotation of the optical disc in response to a second spindle servo drive signal,

wherein the servo driver further outputs the first spindle servo drive signal or the second spindle servo drive signal in response to the first servo control
5 signal.

24. A method of controlling movement of an optical pickup of an optical disc system, the method comprising:

a micro controller unit outputting a limit check command;

10 a servo signal processor driving a focus servo using a focus actuator of an optical pickup in response to the limit check command;

applying a reverse kick voltage to a sled motor;

applying a reverse jump voltage to a tracking actuator of the optical pickup;

15 an optical pickup movement determiner of the servo signal processor receiving a track-related signal and determining whether tracks are detected on an optical disc at a current position of the optical pickup;

if it is determined that tracks are detected, returning to the steps of receiving of the track-related signal and determining whether the tracks are

20 detected on the optical disc; and

if it is determined that tracks are not detected, stopping operations of the sled motor and the tracking actuator.

25. The method of claim 24, the receiving of the track-related signal
5 and determining whether the tracks are detected on the optical disc further comprising:

a first counter of the servo signal processor counting a number of times the track-related signal is output, accumulates count values, and outputting the result as a first count value in response to a counting control signal;

10 a track determiner of the servo signal processor receiving the first count value every limit check period and determining from the first count value whether tracks are detected on the optical disc at the current position of the optical pickup;

if it is determined that tracks are detected, resetting the first counter and
15 repeating the counting of the number of times the track-related signal is output, outputting the result as the first count value in response to the counting control signal, receiving the first count value every limit check period, and determining from the first count value whether tracks are detected; and

if it is determined that tracks are not detected, enabling a track
20 determination signal.

26. The method of claim 25, wherein the counting of the number of times the track-related signal is output, and outputting the result as the first count value in response to the counting control signal comprises:

a second counter of the servo signal processor counting a number of times the track-related signal is output, accumulates count values, and outputting the result as a second count value in response to an enable signal; and

a control signal generator of the servo signal processor comparing the second count value with a first set value and, if the second count value is equal to the first set value, outputting the counting control signal.

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27. An optical disc system comprising:

an optical pickup that radiates a laser beam onto the optical disc to detect light reflected from the optical disc, wherein the optical pickup comprises a tracking actuator, a focus actuator, and an objective lens;

15 a radio frequency amplifier that converts the reflected light into an electric signal to output a track-related signal;

a sled motor that moves the optical pickup toward an inner perimeter of the optical disc in response to a first sled servo drive signal, and toward an outer perimeter of the optical disc in response to a second sled servo drive signal;

20 a servo driver that outputs the first sled servo drive signal and a first tracking servo drive signal in response to a first servo control signal, and outputs

the second sled servo drive signal and a second tracking servo drive signal in response to a second servo control signal;

5 a micro controller unit that outputs a limit check command, determines from the track-related signal whether tracks are detected on the optical disc at a current position of the optical pickup and, if it is determined that tracks are not detected, the micro controller unit outputs a limit check completion signal; and

a servo signal processor that outputs the first servo control signal in response to the limit check command and outputs the second servo control signal in response to the limit check completion signal,

10 wherein the tracking actuator moves the objective lens toward the inner perimeter of the optical disc in response to the first tracking servo drive signal and toward the outer perimeter of the optical disc in response to the second tracking servo drive signal.